THE NEW CANADIAN OBSERVATORY AT VICTORIA, B.C.

THE erection of the new Canadian Government Observatory on Saanich Hill (elevation, 732 ft.), near Victoria, B.C., is progressing very satisfactorily, as the accompanying illustrations show.

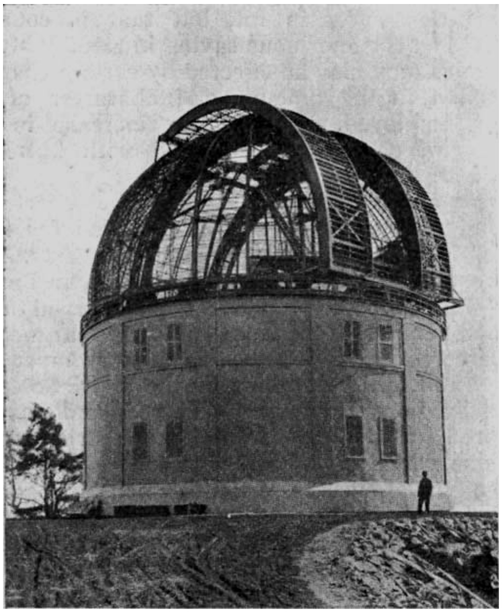

FIG. 1.—The Canadian Observatory at Victoria, B.C., on July 15, 1916.

The dome, which is 66 ft. in diameter and weighs 120 tons (of 2000 lb.), was completed by the Warner and Swasey Co. in March last, and, after being put together and tested at Cleveland, was shipped on March 28. It reached Victoria about April 15, and the structural work was finished about July 1. Both the building and the dome have double walls of sheet-iron, with openings at the foot of the walls and louvres at the top of the dome. Being entirely of metal, the building quickly assumes the temperature of the surrounding air, which circulates freely between the double walls. Though so massive, the dome revolves with great ease.

The mounting of the telescope was complete in May, and on May 25 its operation was shown to a number of invited guests. After the inspection a luncheon was given by Messrs. Warner and Swasey, the guest of honour being Dr. J. S. Plaskett, who will be director of the new observatory. The instrument was then taken down, and after a few slight additions was finally shipped from Cleveland on July 29. It reached Victoria on August 15. The erection began on September 5, and the heavier parts were in place in ten days. However, considerable time was required for the wiring, as seven motors are used to produce the various motions. Fifty wires pass through the polar axis, thirty-four of them being led along the declination axis.

Fig. 1 shows the condition of the building on July 15. The walls are covered with sheet metal, and the dome is ready to receive its sheathing, which was fastened to the lighter iron strips passing in horizontal circles about the dome. In Fig. 2 is shown the way in which the 9½-ton polar axis was transported from Victoria to the summit, a distance of 9½ miles, over the new road built by the British Columbia Government. The great mass of iron left Victoria at 5.30 a.m., August 28, and was at its destination at 1 p.m. The observatory and an observer's house (the only one yet built) are seen in the background. In Fig. 3 the telescope is shown. As will be seen, the mounting is of the English type. The polar axis is nearly 23 ft. long, and consists of two conical tubular portions bolted to a central cubical section.

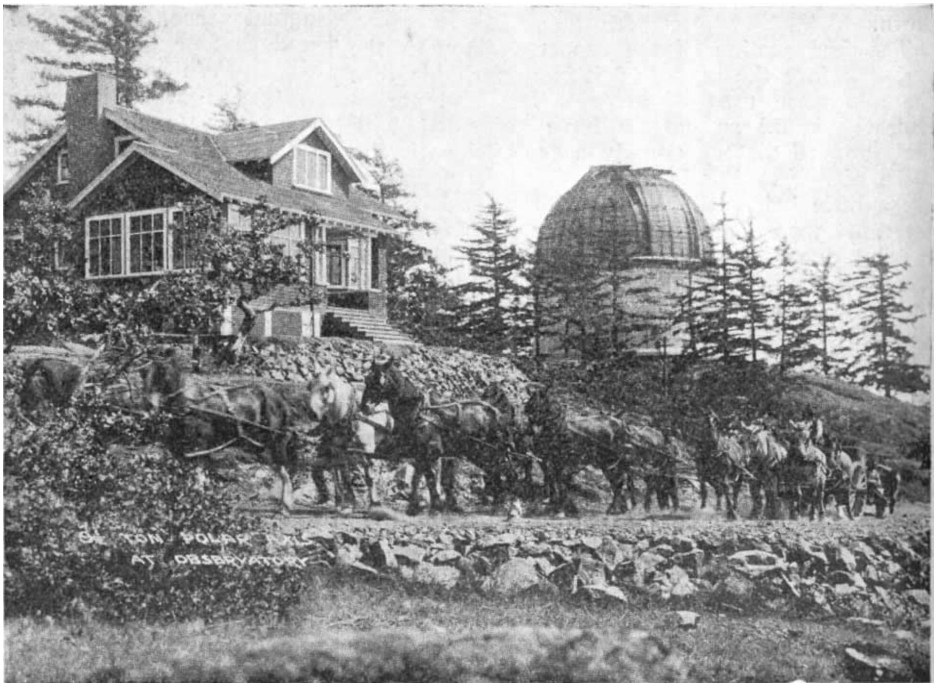

FIG. 2.—Transporting the 9½-ton polar axis to the Observatory, August 28, 1916.

These are castings of the best steel. The driving clock is at the lower end of the axis. The worm-wheel by which the axis is turned is 9 ft. in circumference, and weighs 2 tons. When hoisted into its position the entire weight of the polar axis was about 14 tons. The approximate positions of its bearings had been determined beforehand by means of a wire stretched from one to the other and adjusted by observations with a surveyor's transit. The declination axis is a steel forging 5¼ tons in weight, 14½ ft. long, and 15½ in. in diameter.

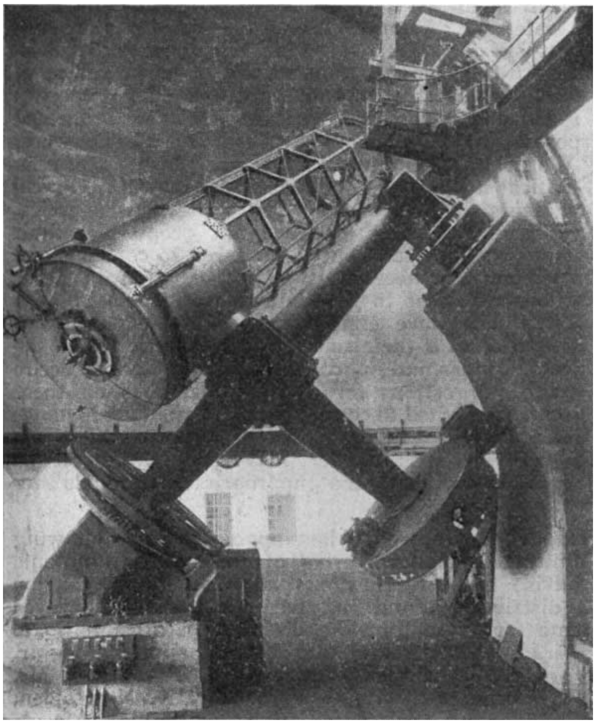

Fig. 3.—The 72-in. reflector, October 22, 1916.

The telescope tube is composed of three sections. At the bottom is the steel mirror cell, 7½ ft. in diameter, which, with mirror counterpoises and mirror, weighs 6 tons. It is bolted to the central section, a steel casting 6 ft. long and weighing 7 tons; while surmounting this is the skeleton tube, more than 23 ft. long, and weighing, with attachments, about 2 tons. Through the centre of the mirror there is a circular hole 10⅛ in. in diameter, and behind this the eyepiece is placed when the telescope is used as a Cassegrain reflector. There are two 4-in. finders, one on each side of the tube, and one of aperture 7 in. and focal length 30 ft. To assist in the adjustment of the axis of the telescope, the long-focus finder was mounted centrally in the tube. The objective can be seen at the upper end of the tube (Figs. 3 and 4), and the eyepiece at the centre of the mirror cell. The correction required to be made to the upper end of the polar axis was 1/50 in. in altitude and 1/25 in. in azimuth. The observing platform is seen near the upper end of the tube. It is moved up and down the shutter opening on rails fastened to the main ribs by cables operated by an electric motor. At each side of the platform are wings, one of which is shown in the figure, movable in and out, to embrace the tube at any convenient position for observing.

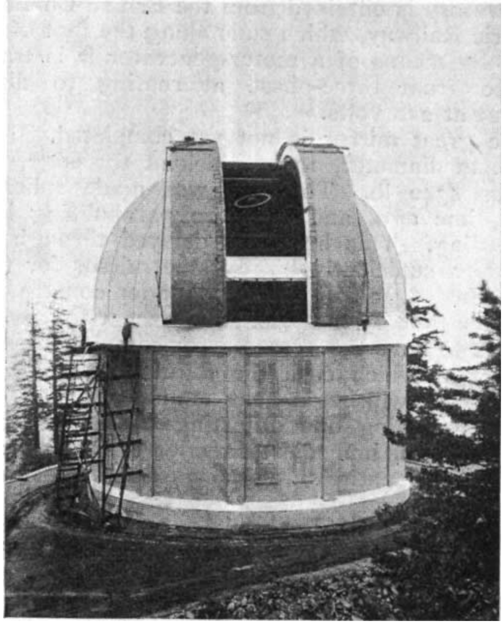

Fig. 4.—The Observatory, October 22, 1916. The shutters are open their full width (15 ft.), and the wind-shield is seen before the telescope.

In order to operate the telescope there are two similar switchboards on the south pier, one on each side, that one being used which happens to be most convenient. In operation the assistant will stand at either one of these switchboards and set the telescope and dome to the required approximate position by means of the three operating switches shown on the switchboard. The one on the left turns the dome east or west at the rate of 60° per minute, the centre one moves the tube north or south 45° per minute, and the switch to the right moves the whole telescope east or west on the polar axis 45° per minute. The push-button switches above serve to illuminate the declination, sidereal, and hour circles, by which the approximate positions are obtained, and to clamp and unclamp the slow motions in R.A. and Declination. The fine setting and guiding are performed by the observer at either the upper or lower end of the tube by small keyboards carried by him when observing, the one at the lower end being shown attached to the cable passing across the lower end of the cell. By pressing the keys on this board two motions are given in either direction in either co-ordinate, the fast one for fine setting 1° in five minutes, and the slow one for guiding at 1/20th of this speed. The telescope responds instantly to all these motions, and can be handled with as great ease as a small refractor.

When it is desired to remove the mirror from the telescope the tube is turned to a vertical position, and a carriage running on rails is brought under it and raised to the required height to receive the cell as it is unbolted from the tube. As the mirror and cell weigh almost 6 tons, a steel strut, running in vertical guides below the floor and counterweighted so as to be easily raised or lowered, is brought up and placed under the other end of the declination axis to prevent it from sinking downwards.

The entire mass of the moving parts is 45 tons, and yet it moves with the greatest ease and smoothness. A small pressure on the upper end of the tube suffices to put it in motion, while the power required to move the telescope at quick speed over that required by the motors when running idle is about 50 watts. The electric power required for the various purposes at the observatory is obtained from the British Columbia Electric Railway, which runs along the foot of the hill. By means of a motor-generator it is transformed from three-phase alternating to direct current at 220 volts.

The great mirror is not yet completed. It is 73 in. in diameter, 12 in. thick at the edge, and weighs 4340 lb. The face was made spherical some time ago, and work on parabolising it is proceeding. This has been delayed through the lack of a sufficiently large plane mirror for testing. Such a mirror has been under construction for some time by the John A. Brashear Co., which expects to have the great mirror completed by the spring, in which case the regular work of the observatory will begin next summer.

The mounting and adjusting of the telescope were under the immediate direction of Dr. Plaskett. Indeed, the entire project must be considered largely his own creation. It was he who first proposed it, and his enthusiastic advocacy of it led the authorities to approve of its construction; his experience as an observer and his great mechanical skill have had much to do with the perfection of the instrument; and his energy is shown in the rapid progress which has been made.

C. A. CHANT.

NOTES.

THE New Year Honours List, the publication of which had been postponed, was issued on Monday, and contains, among others, the following names:—Dr. R. Armstrong-Jones, Prof. R. Lodge, Edinburgh, Mr. Y. L. Raven (formerly chief mechanical engineer of the North-Eastern Railway Co.), and Prof. P. Vinogradoff, Oxford (the honour of knighthood); Dr. A. Newsholme (K.C.B.); Sir Cecil Harcourt-Smith, Victoria and Albert Museum (C.V.O.); Dr. F. Watts, Imperial Commissioner of Agriculture for the West Indies (K.C.M.G.); Mr. L. Rodway, Government Botanist, Tasmania (C.M.G.). A later list states that the honour of knighthood has been conferred upon Prof. Jagadish Chandra Bose, of Calcutta, and Rai Bahadur Sundar Lal, Vice-Chancellor of the Benares Hindu University.

THE committee of the Athenæum Club has elected the following under the provisions of the rule of the club which empowers the annual election by the committee of a certain number of persons "of distinguished eminence in science, literature, the arts, or for public services":—Sir R. Hadfield, Field-Marshal Sir Douglas Haig, and Prof. G. Gilbert A. Murray.

THE Advisory Council of the Government's Department of Scientific and Industrial Research has added to the list of its technical committees a Standing Committee on Glass and Optical Instruments. The membership of the committee is at present as follows: Prof. H. Jackson (chairman), Mr. Conrad Beck, Prof. C. V. Boys, Mr. F. J. Cheshire, Mr. A. E. Conrady, Mr. A. S. Esslemont, Mr. J. W. French, Dr. R. T. Glazebrook, Sir Howard Grubb, Mr. E. B. Knobel, Dr. T. R. Merton, Prof. J. W. Nicholson, Capt. Creagh Osborne, Mr. H. J. Stobart, Mr. J. Stuart, Mr. M. P. Swift, Mr. W. Taylor, Mr. F. Twyman, Lt.-Col. A. C. Williams, and Mr. W. F. J. Wood. The committee, having regard to the urgency of the problems requiring investigation in respect of these essential industries, has appointed a series of subcommittees to which various special problems have been referred. Among these problems the more important are: (*a*) Raw materials for glass and glass-making. (*b*) Optical properties of a large range of glasses. (*c*) General physical and chemical properties of glass and glassware for scientific and industrial purposes. (*d*) Testing and standardising of glassware. (*e*) Workshop technique. (*f*) X-ray glass apparatus. (*g*) Optical calculations and lens designing. (*h*) Optical instruments. (*i*) Translation of foreign works on optics. The Standing Committee does not propose to limit itself to these subjects, but is prepared to consider and report upon the necessity for investigation in other directions relevant to its terms of reference. Manufacturers who have experienced difficulties requiring investigations for their solution in connection with the subjects of glass and optical instruments, or who desire to make suggestions for special researches on these subjects, are invited to communicate in the first instance with the secretary of the Research Department, Great George Street, Westminster, S.W., who will direct the correspondence into the appropriate channels for attention.

THE Food Controller has appointed the following committee of manufacturers of sulphate of ammonia to advise him on questions affecting its production and distribution, and to give effect to an approved scheme for regulating the distribution of supplies to farmers in all parts of the United Kingdom:—Mr. D. Milne Watson (chairman), Mr. W. Fraser, Mr. E. J. George, Mr. W. R. Hann, Mr. N. N. Holden, Mr. A. K. McCosh, Alderman F. S. Phillips, Mr. A. Stanley, and Mr. F. C. O. Speyer, secretary.

THE Director of Army Contracts, War Office, has issued a circular letter to timber merchants directing attention to the fact that the Army Council has assumed control of all stocks of soft wood, planed and unplaned, excluding pit-props, in the United Kingdom. This step has been taken owing to the urgent necessity of safeguarding essential supplies of timber for military purposes, and in view of the growing scarcity of tonnage it is imperative that existing stocks of wood shall be conserved to the utmost, and that no wood shall be consumed for any purpose not essential or where any substitute for wood can be utilised. Pending further regulations, which will be drawn up in consultation with the Timber Trades Federation, dealings in the timber referred to will be permitted, subject to the conditions laid down in the letter.

MAJOR P. A. MACMAHON has been elected president of the Royal Astronomical Society in succession to Dr. R. A. Sampson.